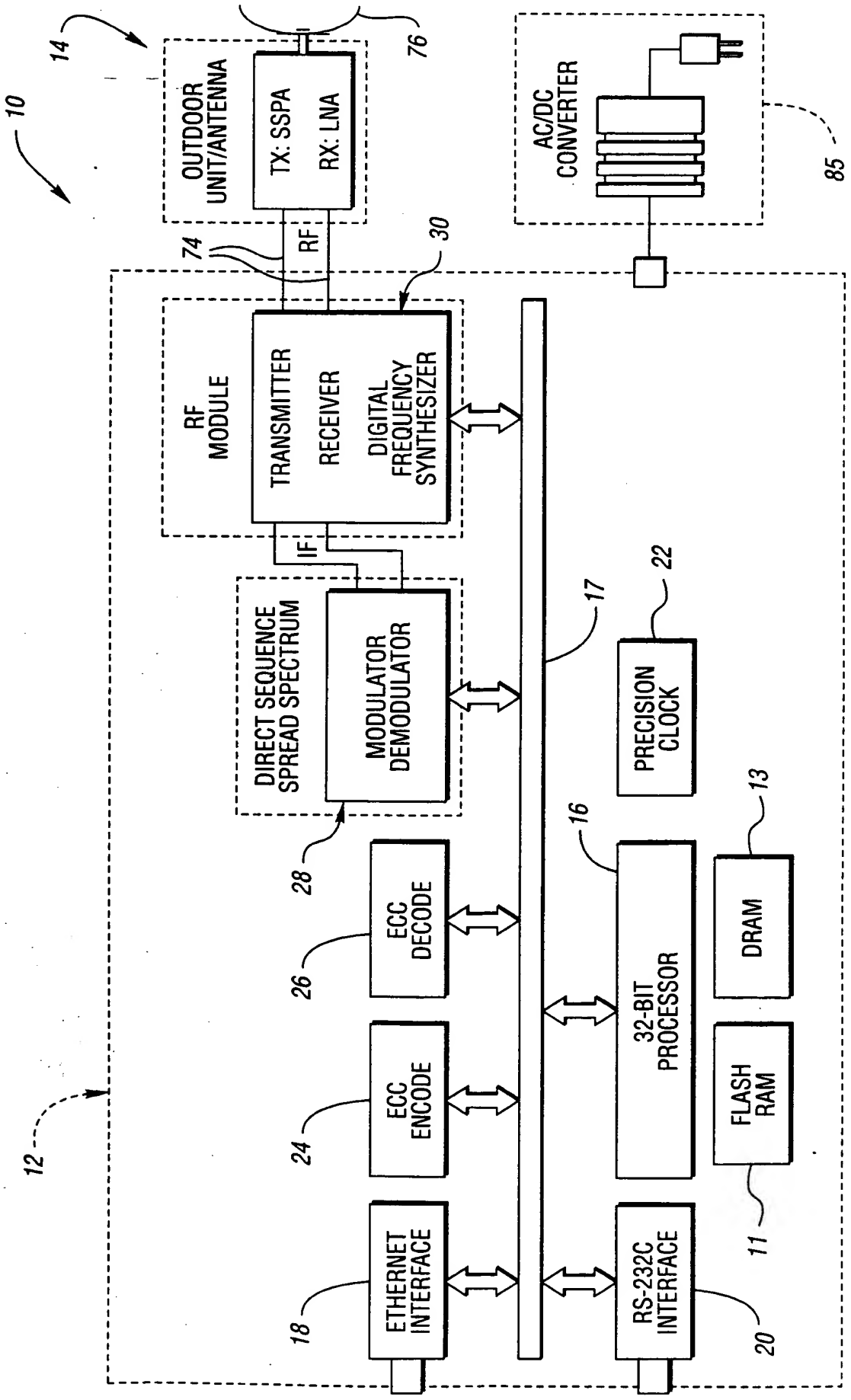

10
12
14
OUTDOOR UNIT/ANTENNA
TX: SSPA
RX: LNA
76
AC/DC CONVERTER
85
74
RF
30
RF MODULE
TRANSMITTER
RECEIVER
DIGITAL FREQUENCY SYNTHESIZER
IF
DIRECT SEQUENCE SPREAD SPECTRUM
MODULATOR DEMODULATOR
28
17
22
PRECISION CLOCK
16
13
ECC DECODE
26
32-BIT PROCESSOR
DRAM
ECC ENCODE
24
FLASH RAM
ETHERNET INTERFACE
18
RS-232C INTERFACE
11
20

Fig. 1

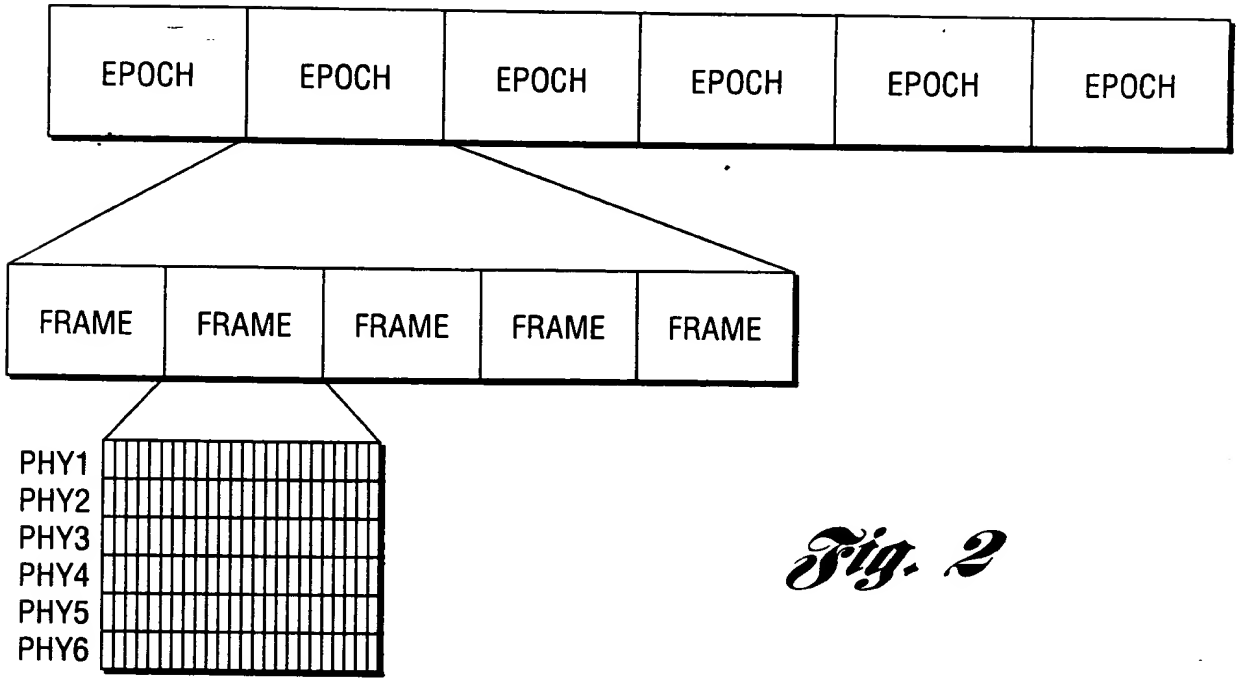

EPOCH
EPOCH
EPOCH
EPOCH
EPOCH
EPOCH
FRAME
FRAME
FRAME
FRAME
FRAME
PHY1
PHY2
PHY3
PHY4
PHY5
PHY6

Fig. 2

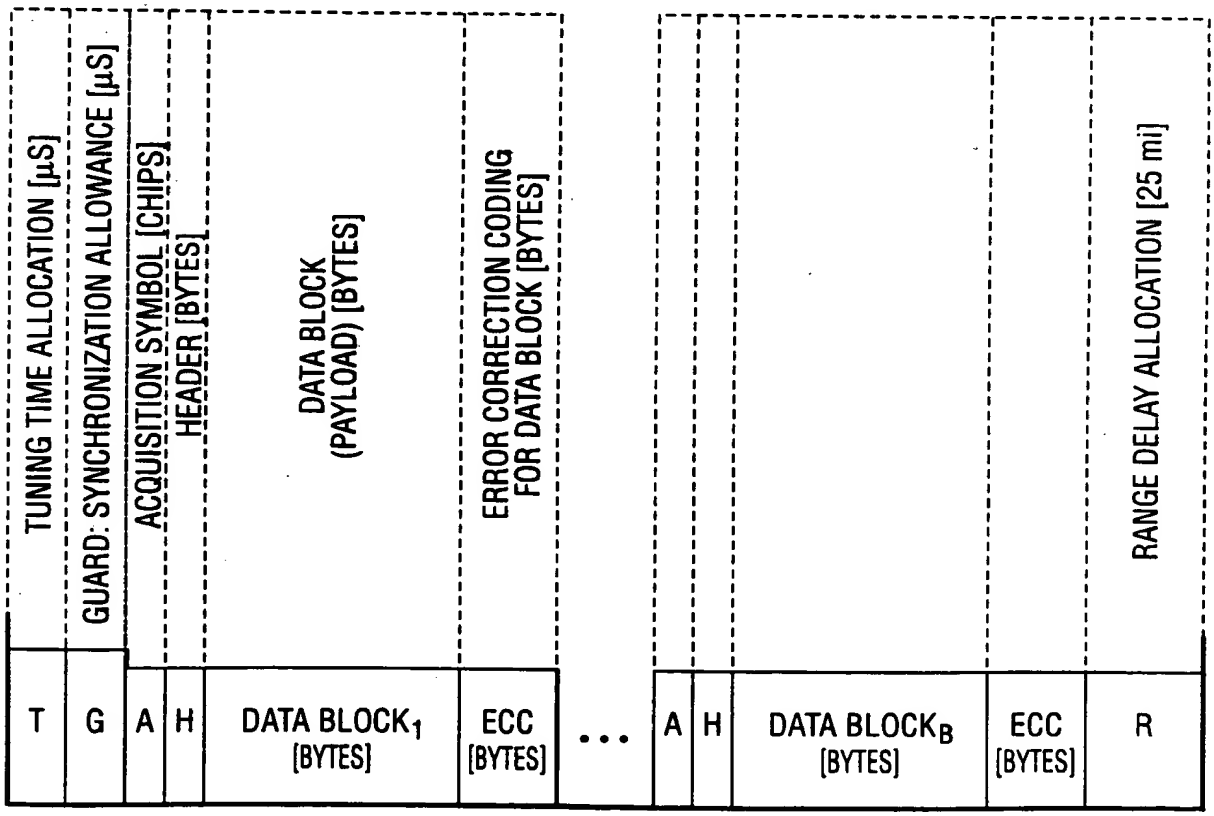

TUNING TIME ALLOCATION [µS]
GUARD: SYNCHRONIZATION ALLOWANCE [µS]
ACQUISITION SYMBOL [CHIPS]
HEADER [BYTES]
DATA BLOCK (PAYLOAD) [BYTES]
ERROR CORRECTION CODING FOR DATA BLOCK [BYTES]
RANGE DELAY ALLOCATION [25 mi]
T
G
A
H
DATA BLOCK1 [BYTES]
ECC [BYTES]
...
A
H
DATA BLOCKB [BYTES]
ECC [BYTES]
R

Fig. 3

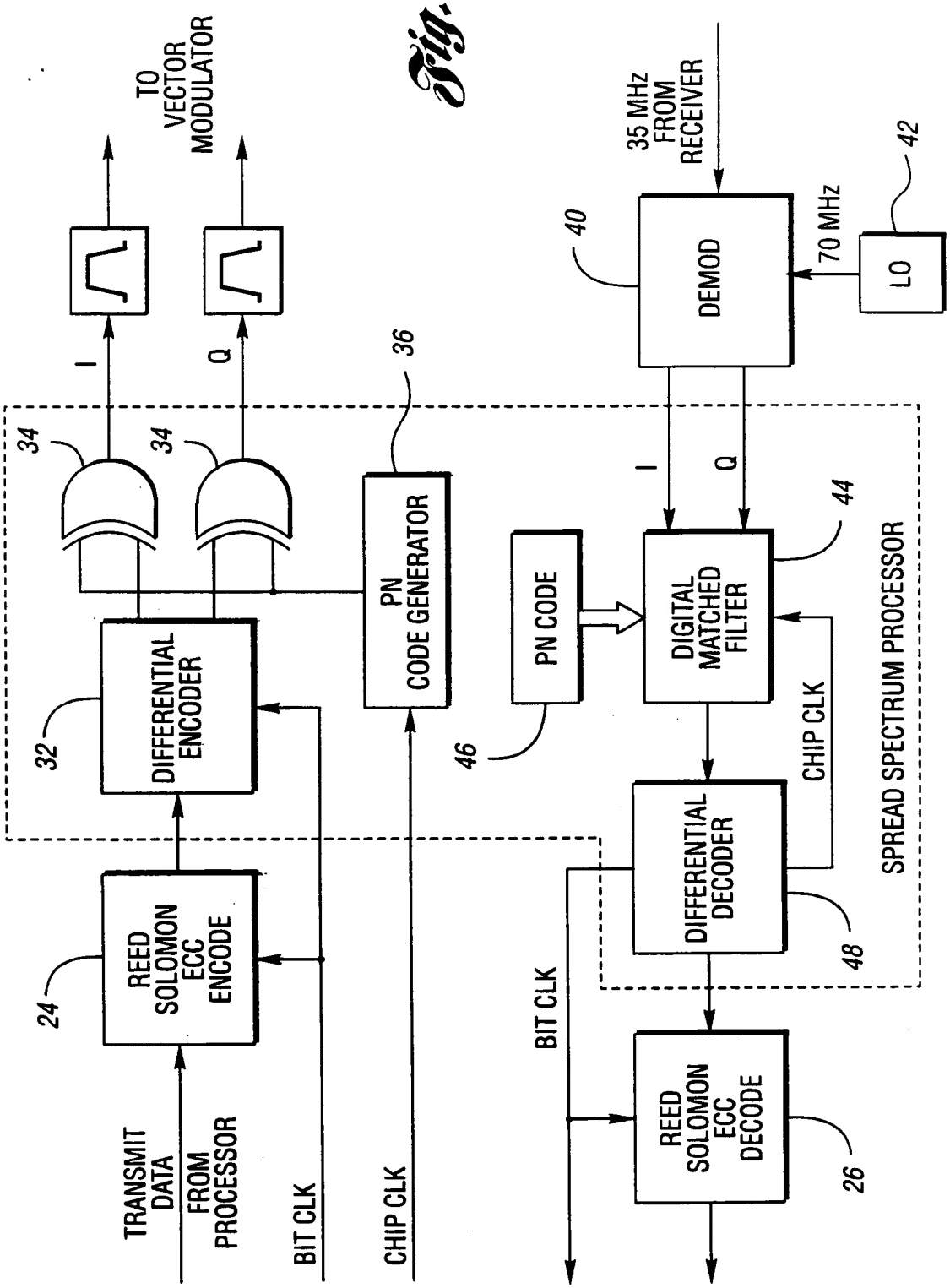

TO VECTOR MODULATOR
35 MHz FROM RECEIVER
42
40
DEMOD
70 MHz
LO
I
Q
36
34
34
PN CODE GENERATOR
PN CODE
DIGITAL MATCHED FILTER
44
46
DIFFERENTIAL ENCODER
32
CHIP CLK
DIFFERENTIAL DECODER
48
SPREAD SPECTRUM PROCESSOR
REED SOLOMON ECC ENCODE
24
BIT CLK
REED SOLOMON ECC DECODE
26
TRANSMIT DATA FROM PROCESSOR
BIT CLK
CHIP CLK

Fig. 4

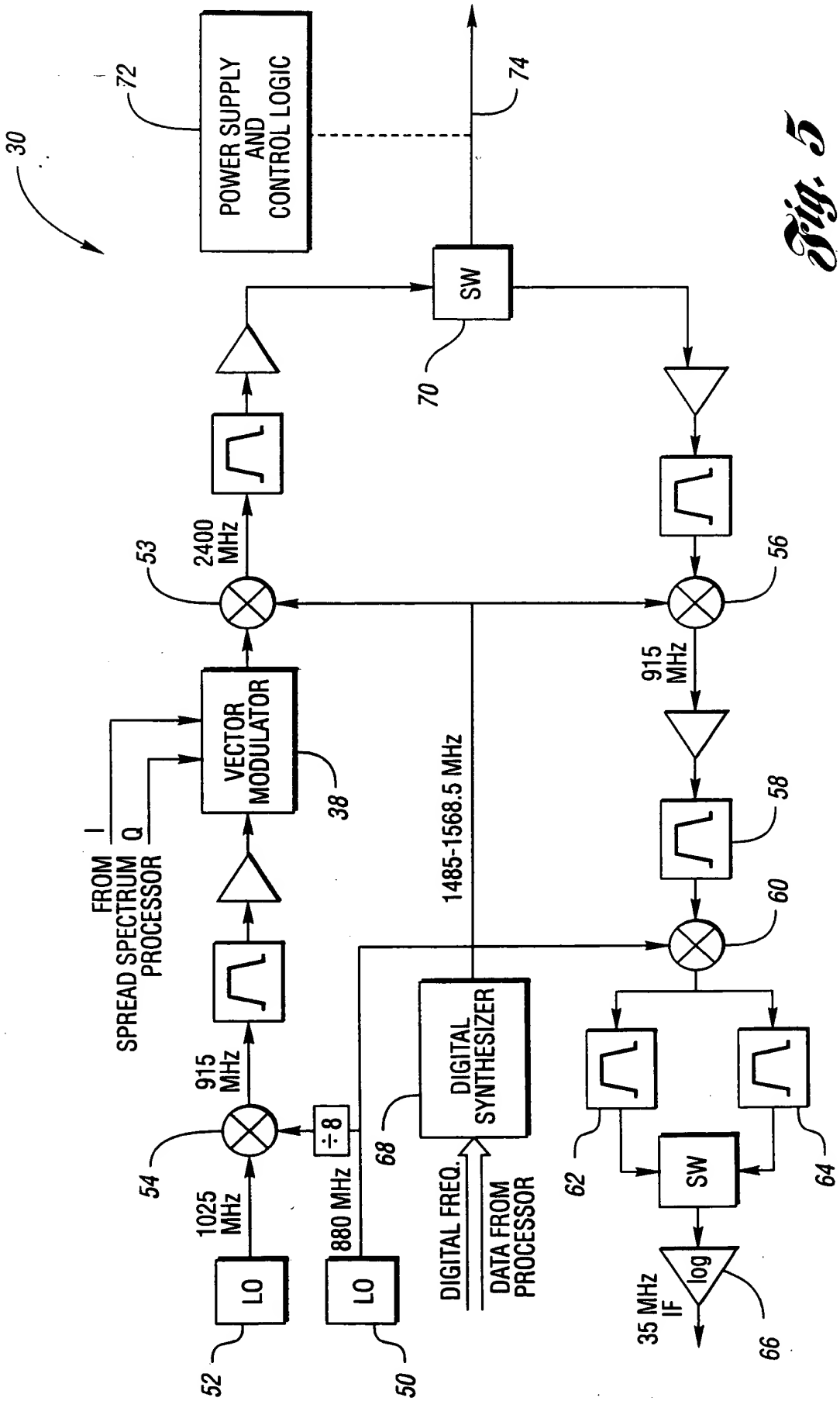

30
72
POWER SUPPLY AND CONTROL LOGIC
74
SW
70
2400 MHz
53
56
915 MHz
VECTOR MODULATOR
38
FROM SPREAD SPECTRUM PROCESSOR
I
Q
1485-1568.5 MHz
58
60
915 MHz
÷8
DIGITAL SYNTHESIZER
68
54
1025 MHz
880 MHz
LO
LO
52
50
DIGITAL FREQ.
DATA FROM PROCESSOR
62
SW
64
35 MHz IF
log
66

Fig. 5

Fig. 6

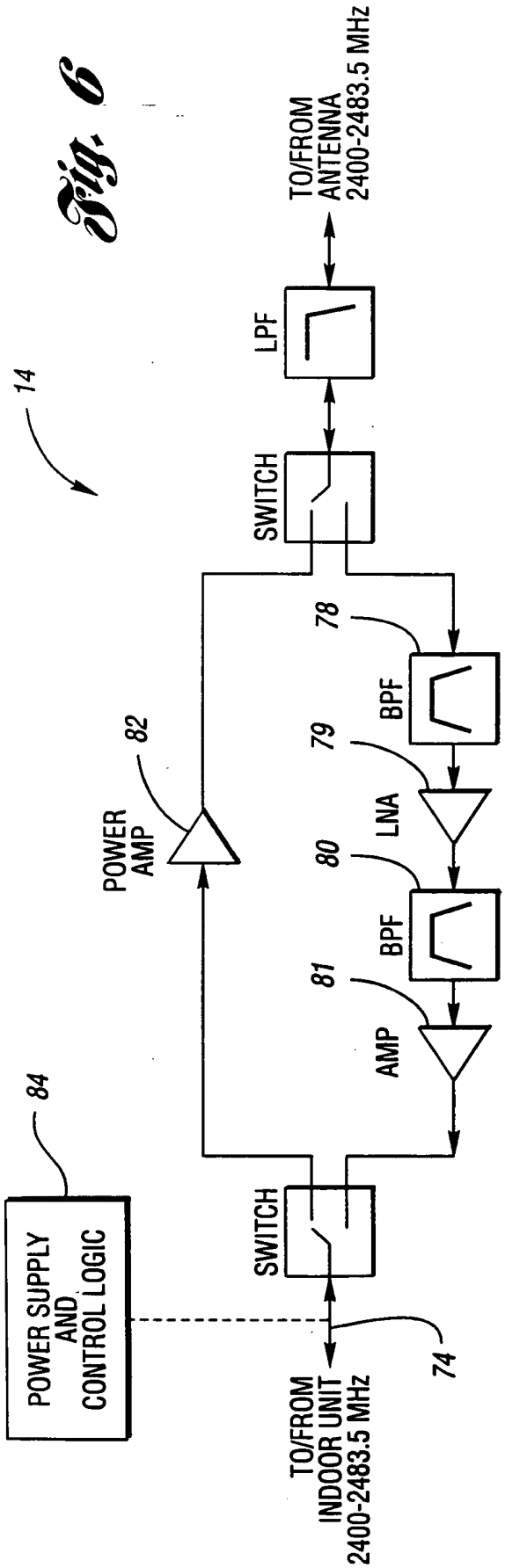
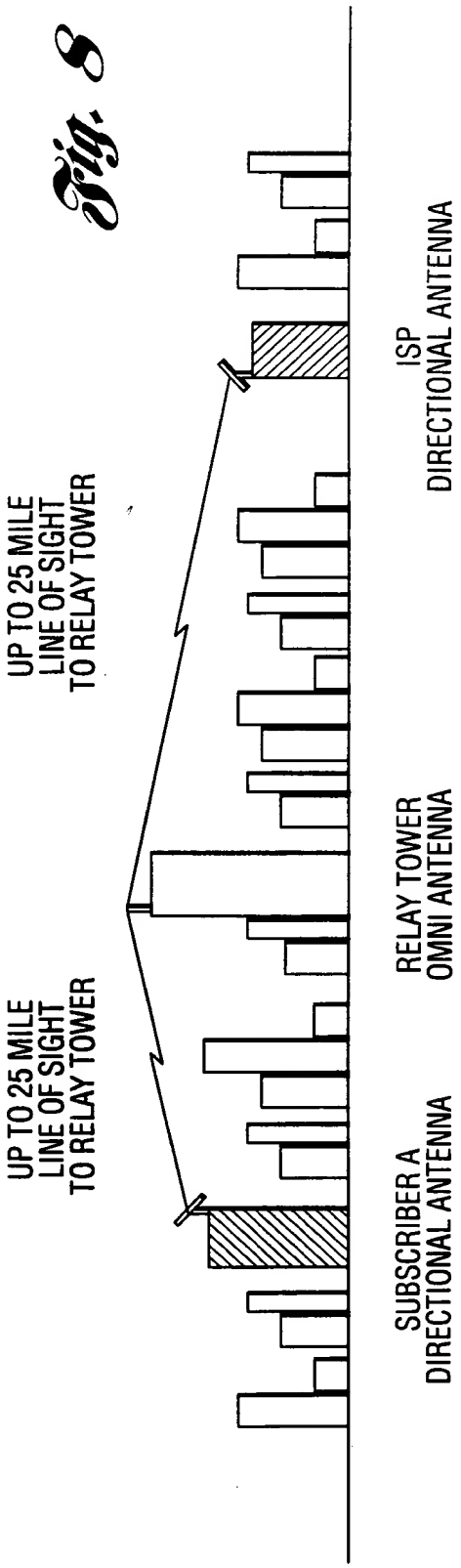

14
TO/FROM ANTENNA 2400-2483.5 MHz
LPF
SWITCH
78
BPF
79
LNA
80
BPF
81
AMP
82
POWER AMP
84
POWER SUPPLY AND CONTROL LOGIC
SWITCH
74
TO/FROM INDOOR UNIT 2400-2483.5 MHz

Fig. 8


UP TO 25 MILE LINE OF SIGHT TO RELAY TOWER
UP TO 25 MILE LINE OF SIGHT TO RELAY TOWER
ISP DIRECTIONAL ANTENNA
RELAY TOWER OMNI ANTENNA
SUBSCRIBER A DIRECTIONAL ANTENNA

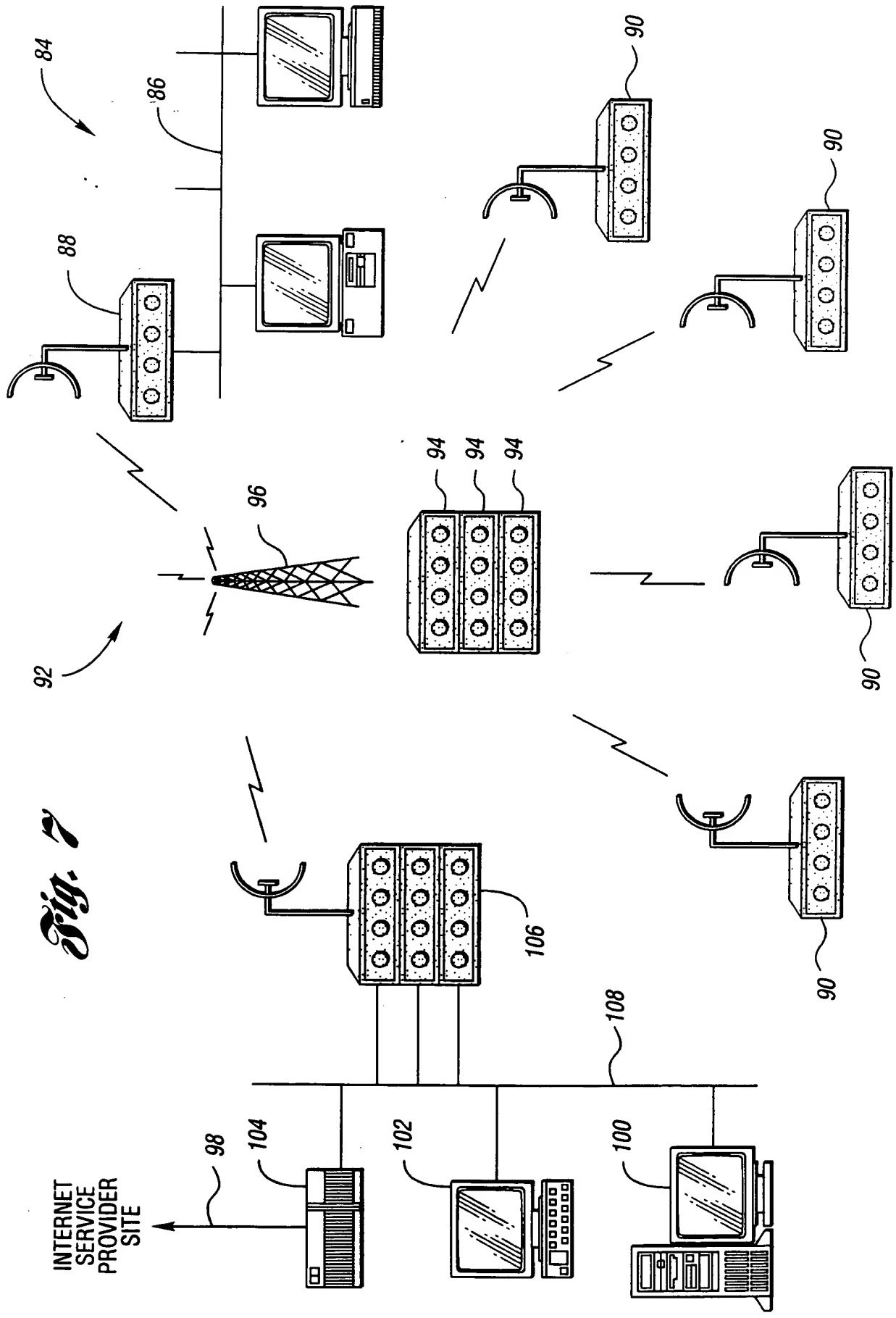

84
86
88
90
90
90
90
92
94
94
94
96
98
100
102
104
106
108
INTERNET SERVICE PROVIDER SITE

Fig. 2

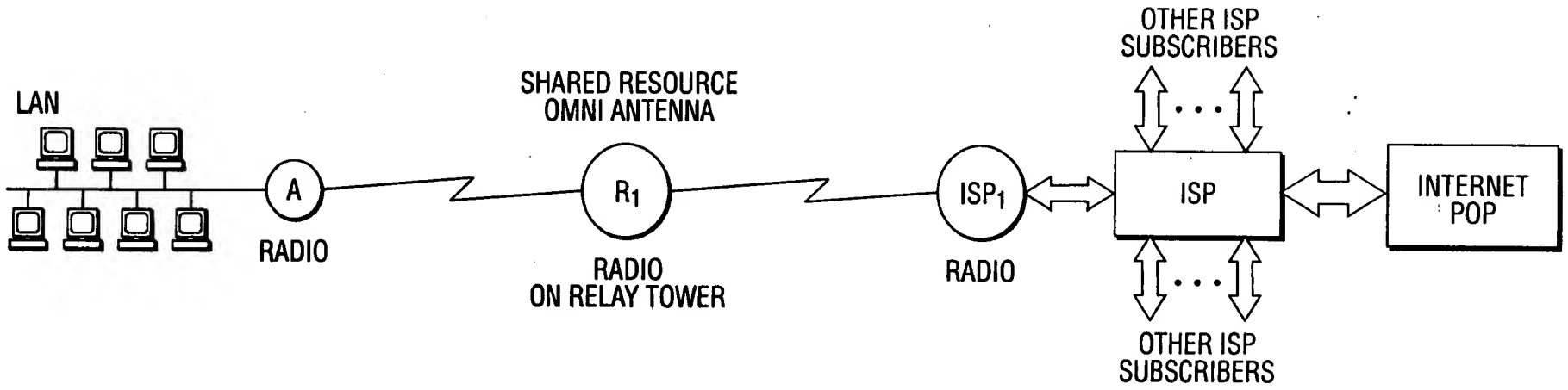

LAN
A
RADIO
SHARED RESOURCE
OMNI ANTENNA
R1
RADIO
ON RELAY TOWER
ISP1
RADIO
OTHER ISP
SUBSCRIBERS
ISP
INTERNET
POP
OTHER ISP
SUBSCRIBERS
PHYSICAL CHANNEL (PHY 1):
A A A A A A A A A A A A A A A A A A A A
TIME DIVISION: EACH SLOT IS A PACKET TRANSFER

Fig. 9

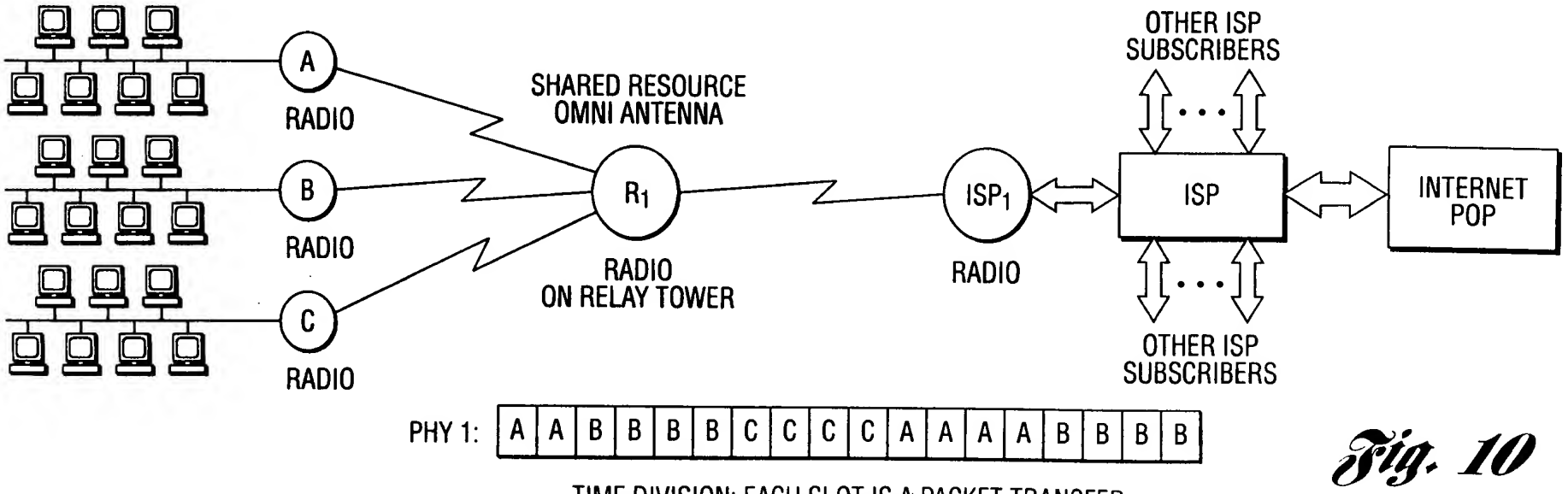
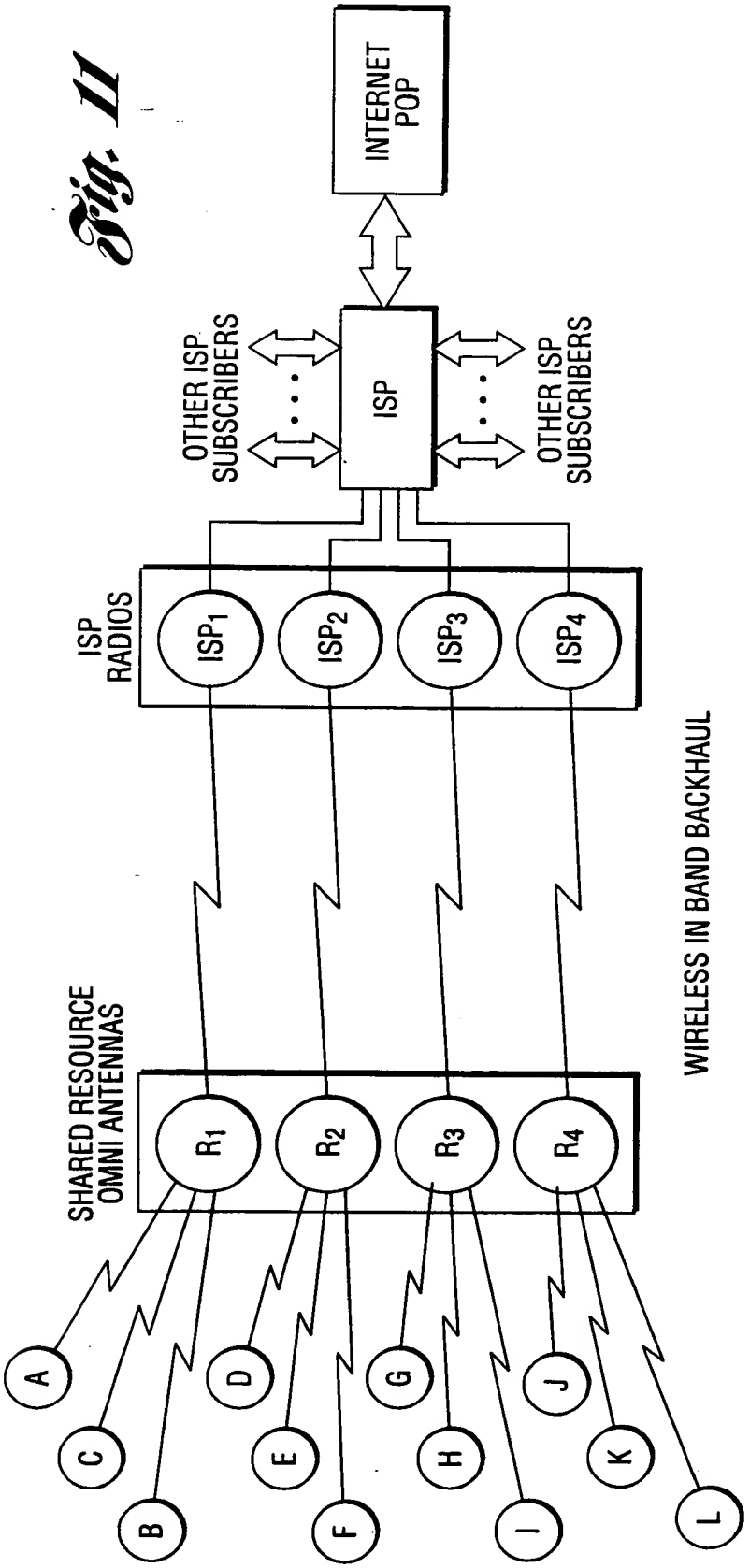

A
RADIO
B
RADIO
C
RADIO
SHARED RESOURCE
OMNI ANTENNA
R1
RADIO
ON RELAY TOWER
ISP1
RADIO
OTHER ISP
SUBSCRIBERS
ISP
INTERNET
POP
OTHER ISP
SUBSCRIBERS
PHY 1:
A A B B B B C C C C A A A A B B B B
TIME DIVISION: EACH SLOT IS A PACKET TRANSFER

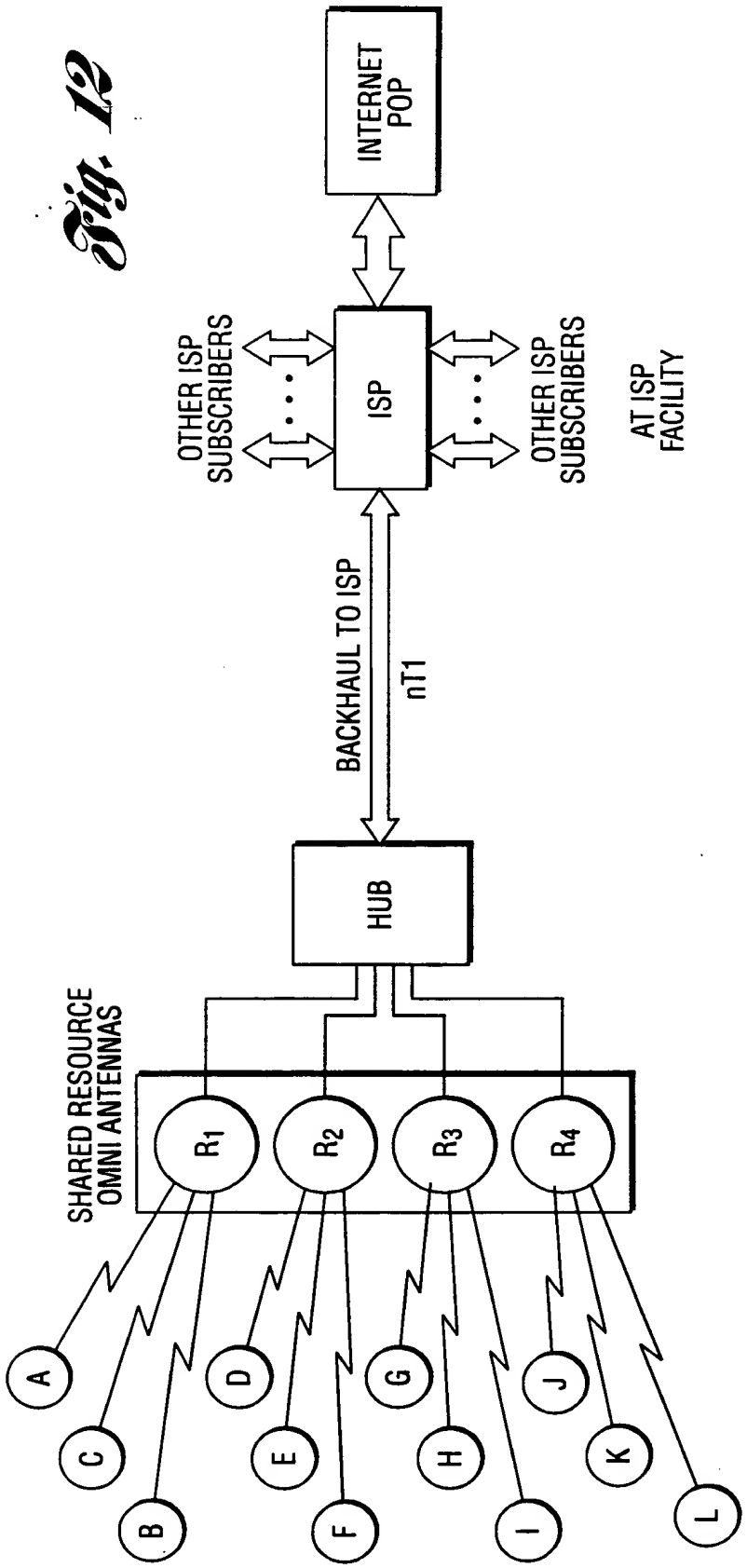
Fig. 10

Fig. 11



PHY 1:	A	A	B	B	B	C	C	C	C	A	A	A	B	B	B	B
PHY 2:	D	D	D	D			E	E	E	E	E	F	F	F	F	F
PHY 3:	G	G	G	G	H	H	H	H	I	I	I	I	I	I	I	I
PHY 4:	J	J	J	J	J	K	K	K	L	L	L	L	L	L	L	L

Fig. 12



PHY 1:	A	A	B	B	B	B	C	C	C	C	A	A	A	B	B	B	B	B	B	B	B	B	B
PHY 2:	D	D	D	D				E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F
PHY 3:	G	G	G	G	H	H	H	H	H	H	I	I	I	I	I	I	I	I	I	I	I	I	I
PHY 4:	J	J	J	J	J	K	K	K	K	K	L	L	L	L	L	L	L	L	L	L	L	L	L

Fig. 13

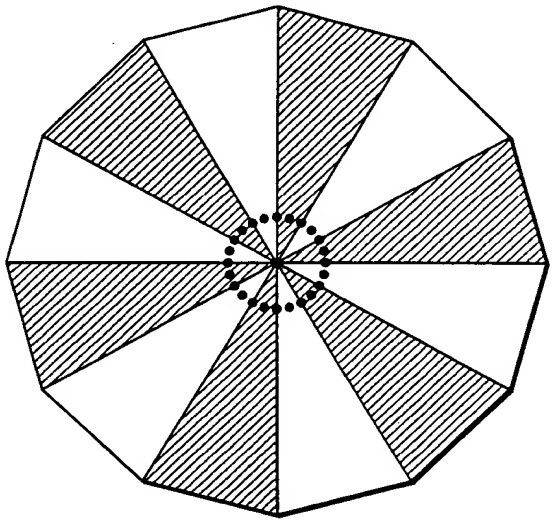


Fig. 14

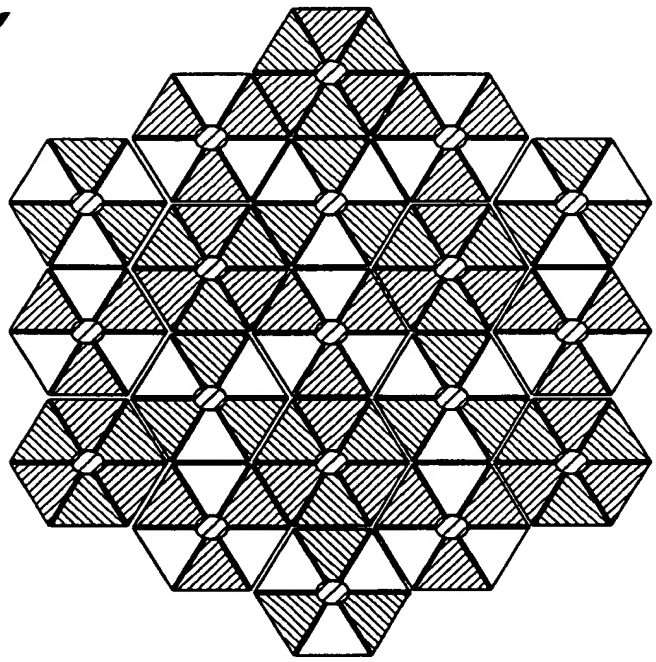
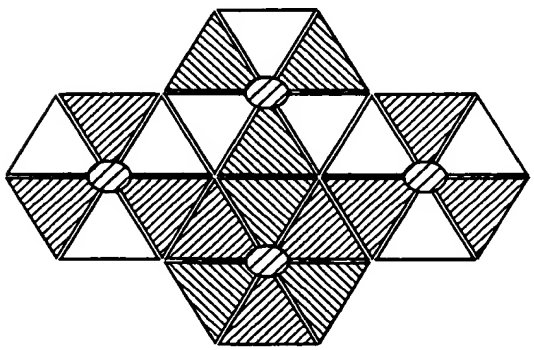


Fig. 15



[redacted]

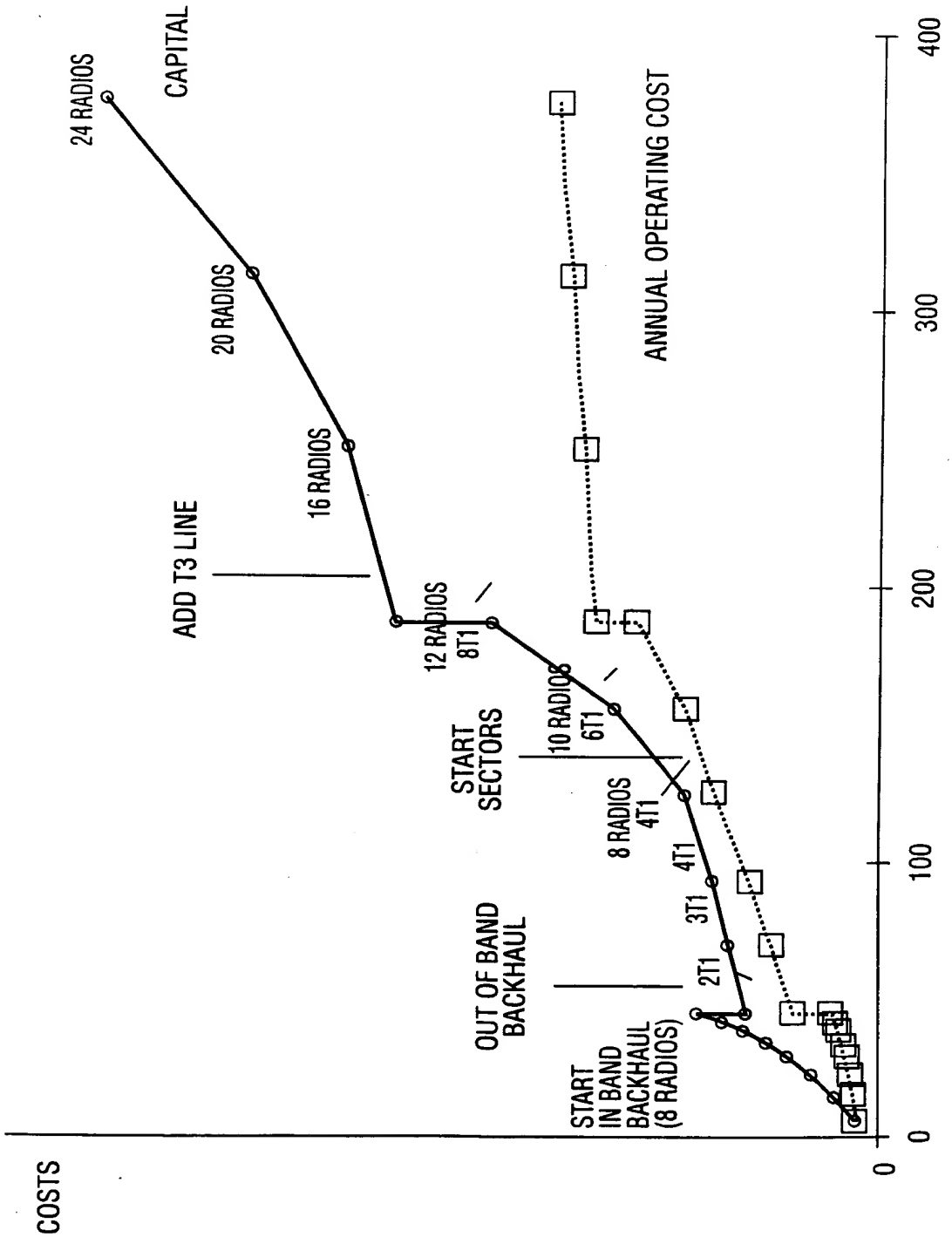

COSTS
CAPITAL
ANNUAL OPERATING COST
0
100
200
300
400
24 RADIOS
20 RADIOS
16 RADIOS
12 RADIOS
8T1
10 RADIOS
6T1
8 RADIOS
4T1
4T1
3T1
2T1
ADD T3 LINE
START SECTORS
OUT OF BAND BACKHAUL
START IN BAND BACKHAUL (8 RADIOS)

Fig. 16